Check List the journal of biodiversity data

NOTES ON GEOGRAPHIC DISTRIBUTION

Check List 15 (6): 1071–1075
https://doi.org/10.15560/15.6.1071

PENSOFT

New records of *Cladomelea* from South Africa, including the first records of *C. longipes* (O. Pickard-Cambridge, 1877) (Araneae, Araneidae) outside its type locality

Anna Sophia Dippenaar-Schoeman[1,2], Stefan Hendrik Foord[2]

1 Plant Health and Protection, Agricultural Research Council, Pretoria, South Africa, 0106. **2** Department of Zoology and Centre for Invasion Biology, School of Mathematical and Natural Sciences, University of Venda, Thohoyandou, Limpopo, South Africa, 0950.
Corresponding author: stefan.foord@univen.ac.za

Abstract
We present the first records of the bolas spider, *Cladomelea longipes* (O. Pickard-Cambridge, 1877), beyond its type locality, resulting in a considerable extension of its geographic range in Africa. We compare *C. longipes* with the two other species of *Cladomelea* known from South Africa, *C. akermani* Hewitt, 1923 and *C. debeeri* Roff & Dippenaar-Schoeman, 2004. Images of live specimens and a distribution map are provided. *Cladomelea longipes* is very rare locally but has a relatively large geographical distribution in the Afrotropical Region.

Keywords
Cladomelea akermani, *Cladomelea debeeri*, geographical distribution, Zimbabwe, Cameroon.

Academic editor: Alireza Zamani | Received 12 September 2019 | Accepted 9 October 2019 | Published 6 December 2019

Citation: Dippenaar-Schoeman AS, Foord SH (2019) New records of *Cladomelea* from South Africa, including the first records of *C. longipes* (O. Pickard-Cambridge, 1877) (Araneae, Araneidae) outside its type locality. Check List 15 (6): 1071–1075. https://doi.org/10.15560/15.6.1071

Introduction

The African bolas spiders belong to the genus *Cladomelea* Simon, 1895 (Araneidae). It is a small genus with four species, all endemic to the African continent. The type species, *Cladomelea longipes* (O. Pickard-Cambridge, 1877), was described based on a single female. The second species, *C. ornata* Hirst, 1907, is only known from the female holotype collected in the Democratic Republic of the Congo. The female of the third species, *C. akermani* Hewitt, 1923, was described from South Africa and the description of the male was later provided by Leroy et al. (1998). The fourth species, *C. debeeri* Roff & Dippenaar-Schoeman, 2004 is only known from the female holotype collected in South Africa.

Members of *Cladomelea* are known as bolas spiders. Like most other representatives in the subfamily Mastophorinae, *Cladomelea* spp. construct a highly modified orb web (Akerman 1923; Stowe et al. 1987; Scharff and Coddington 1997; Leroy et al. 1998) consisting of a short silk thread, the bolas line, with one to several sticky globules (or "bolas") fixed to the free end (Eberhard 1980). The bolas line is rotated, catching prey, usually moths, from the air (Eberhard 1977; Pekár et al. 2012). Some bolas spiders lure their prey with a substance emitted from glands on the front legs, mimicking the sex attractant of female moths (Lopez 1987; Yeargan 1994).

This study aims to provide geographic records for *C. longipes* outside of its type locality. As new localities also include first records for South Africa, the species morphology is compared with the two species *C. akermani* and *C. debeeri*, which are also known from South Africa.

Methods

During the South African National Survey of Arachnida (SANSA), requests were made for photographs for the SANSA Virtual Museum and images of three species of *Cladomelea* were received. As part of this study, materials of three *Cladomelea* species were received on loan from ZMUC (Zoological Museum, University of Copenhagen, Denmark), MRAC (Koninklijk Museum voor Midden-Afrika, Tervuren, Belgium), NCA (National Collection of Arachnida, Pretoria, South Africa), and NMSA (KwaZulu-Natal Museum, South Africa).

Results

Araneae Clerck, 1757
Araneidae Clerck, 1757

***Cladomelea* Simon, 1895**

***Cladomelea longipes* (O. Pickard-Cambridge, 1877)**

Cyrtarachne longipes O. Pickard-Cambridge 1877: 559, pl. 56 (♀). (Holotype ♀: banks of the river Coanza, West Africa, Mr Henry Rogers, 1873, Oxford University Museum (OUMNH)—not examined).

Cladomelea longipes: Simon 1895: 883, figs 949, 950 (♀).

New records. Material examined. Cameroon • 1 ♀; 12.3547°N, 007.3697°E; ZMUC 00001445. Democratic Republic of the Congo • 1 ♀; Rutshuru; 01.183333°S, 029.45°E; ii.1937; J. Ghesquière; MRAC 57333 • 1 ♀; Kisantu; 04.615°S, 015.1044°E; R. Vanderyst; MRAC 24356.

Photographs. Zimbabwe • 1 ♀; Harare; 17.8167°S, 031.083°E; M. Cumming; 11.vi.2012. South Africa • 1 ♀; Limpopo; Klaserie; 24.55°S, 031.02°E; 15.v.2013; K. Wiesler.

Identification. According to Levi (2003) the three genera in the bolas spider group, *Mastophora* Holmberg, 1876, *Ordgarius* Keyserling, 1886 and *Cladomelea* share outgrowths or projections on the carapace. Based on Leroy et al. (1998), *Cladomelea* is characterized by the lack of a row of strong spines on the anterior legs of the females; instead, they possess a dense layer of thin, long setae. A double row of teeth is present on the prolateral cheliceral margin with denticles scattered in between. These small to medium-sized spiders vary in colour and are recognizable by the strong erect tubercles arranged in a row on the carapace. Some species are decorated with tubercles and strong setae and the shape and colour of the abdomen vary. The front legs are longer than the rest.

The *Cladomelea* bolas spiders are nocturnal spiders that construct a modified orb-web that has been reduced to a strand of silk that terminates in one to three sticky droplets, and is referred to as "bolas". The silk thread is held by one of the second pair of legs, while the spider hangs from a trapeze line constructed in foliage using the fourth pair of legs. They swing the bolas rapidly until it contacts flying moths, which are then rapidly drawn in towards the spider as it reels in the thread (Akerman 1923; Leroy et al. 1998). The spiders usually rest in a retreat in foliage close to the trapeze line. The egg sacs are round, brown, and attached to twigs close to the trapeze line. Each egg sac contains between 150–200 eggs.

Considering the current data, three species are known from South Africa: *C. akermani* (Leroy et al. 1998), *C. debeeri* (Roff and Dippenaar-Schoeman, 2004) and *C. longipes* (current data) (Fig 1).

The female *C. longipes* was described in 1877 from the Democratic Republic of the Congo. This species differs from its congeners in the colour of the body and shape of the abdomen and copulatory organs. The carapace is greyish-pink and covered in dense setae, giving it a woolly appearance. The carapace is broad, rounded posteriorly, and narrowed anteriorly. The ocular tubercle is high and bears a row of three strong erect spines medially. The colour of the base of the spines is similar to that of carapace but are apically dark, with the middle spine being the longest (Fig. 2B). The medial area of the ocular region is protruding and has four small median eyes while the lateral eyes are positioned close together near the carapace edge (Fig. 2H). The posterior lateral eyes are the largest. The sternum is pink, heart-shaped with a posterior tip extending between the posterior legs (Fig. 2D).

The abdomen is triangular, dorsally pink, and infused with a grey guanophore and silky hair, giving it a woolly appearance (Fig. 2E). Two large, yellow, and round tubercles are present on the antero-lateral corners of abdomen and four smaller white round tubercles are arranged in rows in between (Fig. 2C, H). Similar small white tubercles decorate the abdomen posteriorly. Ventrally, the abdomen is pink and has a woolly appearance.

The legs are slender with the formula 1243. The coxae, trochanters, and femora of all legs are pink. The

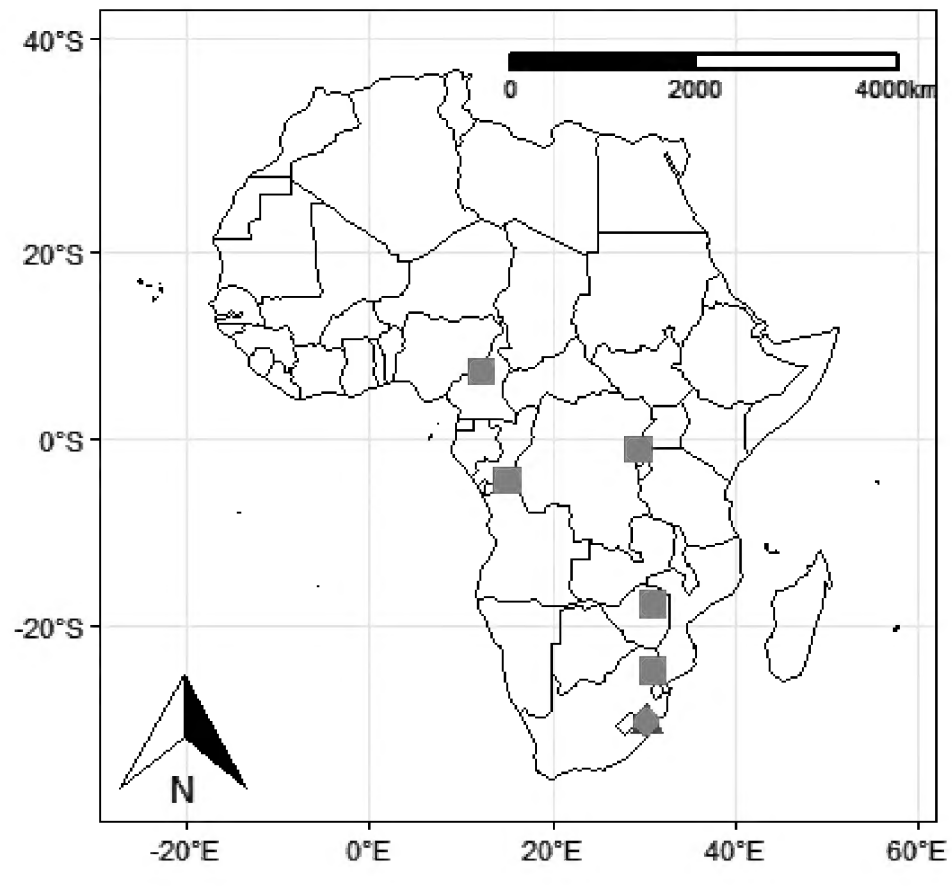

Figure 1. Afrotropical distribution of *Cladomelea* species known from South Africa: *C. longipes* (blue squares), *C. akermani* (green triangle) and *C. debeeri* (red circle).

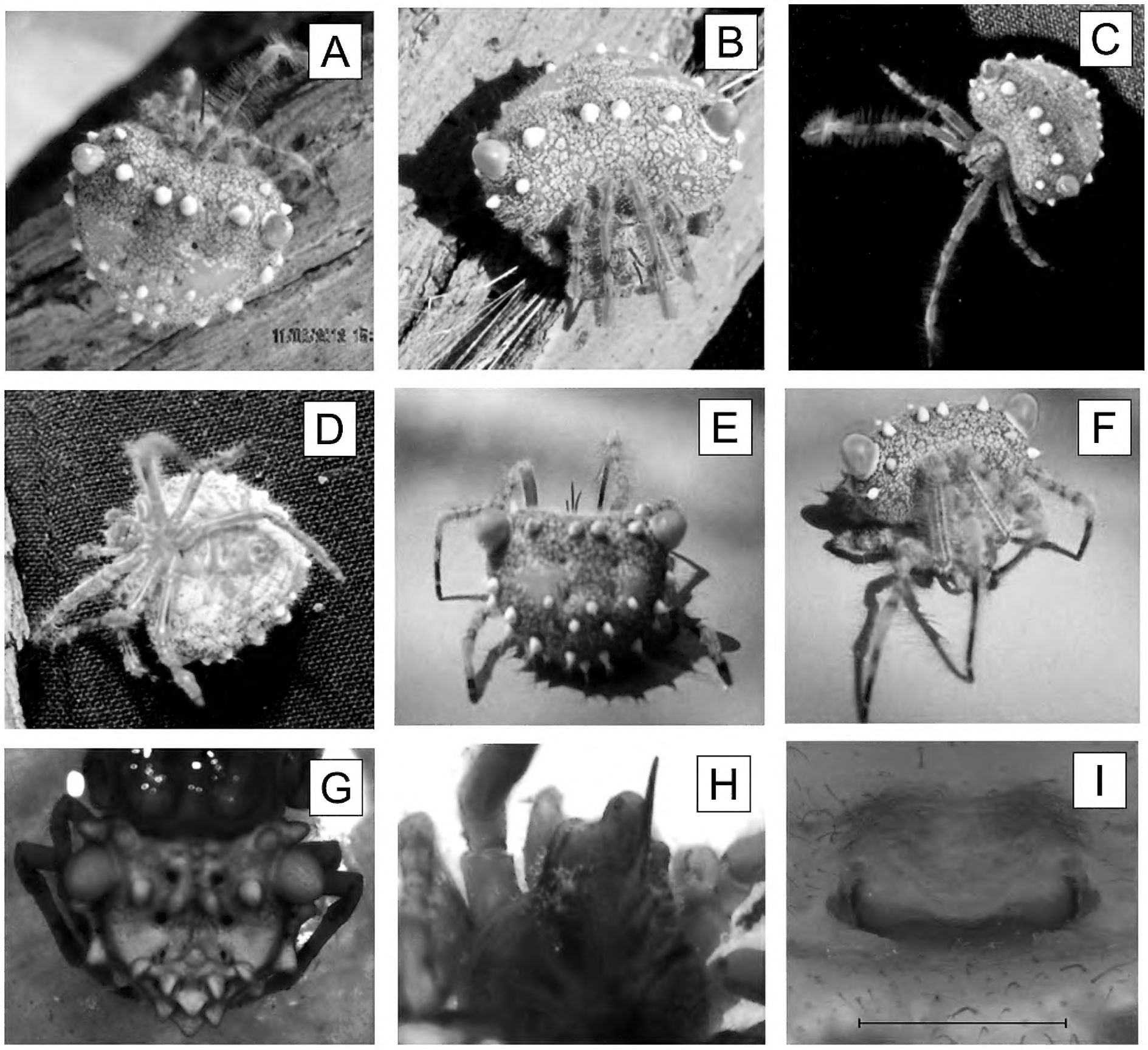

Figure 2. *Cladomelea longipes*, female habitus and epigyne. **A.** Dorsal view of abdomen (Harare). **B.** Dorsal view, showing carapace setae and legs (Harare). **C.** In action (Harare). **D.** Ventral view (Harare). **E.** Abdomen, dorsal view (Klaserie). **F.** Showing the silky hair on legs (Klaserie); G. Abdomen, dorsal view, preserved material (Cameroon). **H.** Carapace and eye pattern, dorsal view (Cameroon); I. Epigyne, ventral view (Democratic Republic of the Congo). Scale bar = 0.5 mm.

rest of the leg segments are yellow with darker bands. Metatarsi and tarsi I are covered with a dense layer of thin, long silky hair (Fig. 2C, F). The summed length of patella and tibia I is slightly shorter than the summed length of metatarsus and tarsus I. The epigyne lacks a scape, is wider than long with a posterior edge that is sclerotized (Fig. 2I). The male is unknown.

Comparative material examined.

***Cladomelea akermani* Hewitt, 1923**

Cladomelea akermani Hewitt 1923: 63, figs 4, 5 (♀).
Cladomelea akermani: Leroy et al. 1998: 1, figs 1–7 (♂♀).
Cladomelea akermani: Levi 2003: 378, figs 434, 444 (♂♀).

The female of this species is distinct in having three long, sharp-tipped projections on the carapace, with the posterior projection the longest and the anterior one the shortest in the holotype female, but length varies between different specimens. Legs are long and densely covered with long, thin setae. The abdomen is cream coloured, heart-shaped, widest in middle and decorated with numerous small rounded tubercles (Fig. 3A, B). For male description see Leroy et al. (1998). Known only from South Africa (Fig. 1).

Material examined. South Africa. KwaZulu-Natal • holotype ♀; Pietermaritzburg; 29.60°S, 030.38°E, vii. 1915; C. Akerman; NM 7017; • 1♀; Howick, Umgeni Valley Reserve; 29.47°S, 030.20°E, ii.2007; K. Ducasse; NCA 2007/2608; • 1♀; same locality; i.1999; A. Leroy; NCA 2010/1990; • 1♀; same locality; ii.2010; night collecting; J. Leroy; NCA 2010/1990.

Photographs. South Africa. KwaZulu-Natal • ♀ with egg sacs; Hilton; 29.56°S, 030.30°E; J. Roff; SANSA 2013/286.

***Cladomelea debeeri* Roff & Dippenaar-Schoeman, 2004**

Cladomelea debeeri Roff and Dippenaar-Schoeman 2004: 3, figs 1–5 (♀).

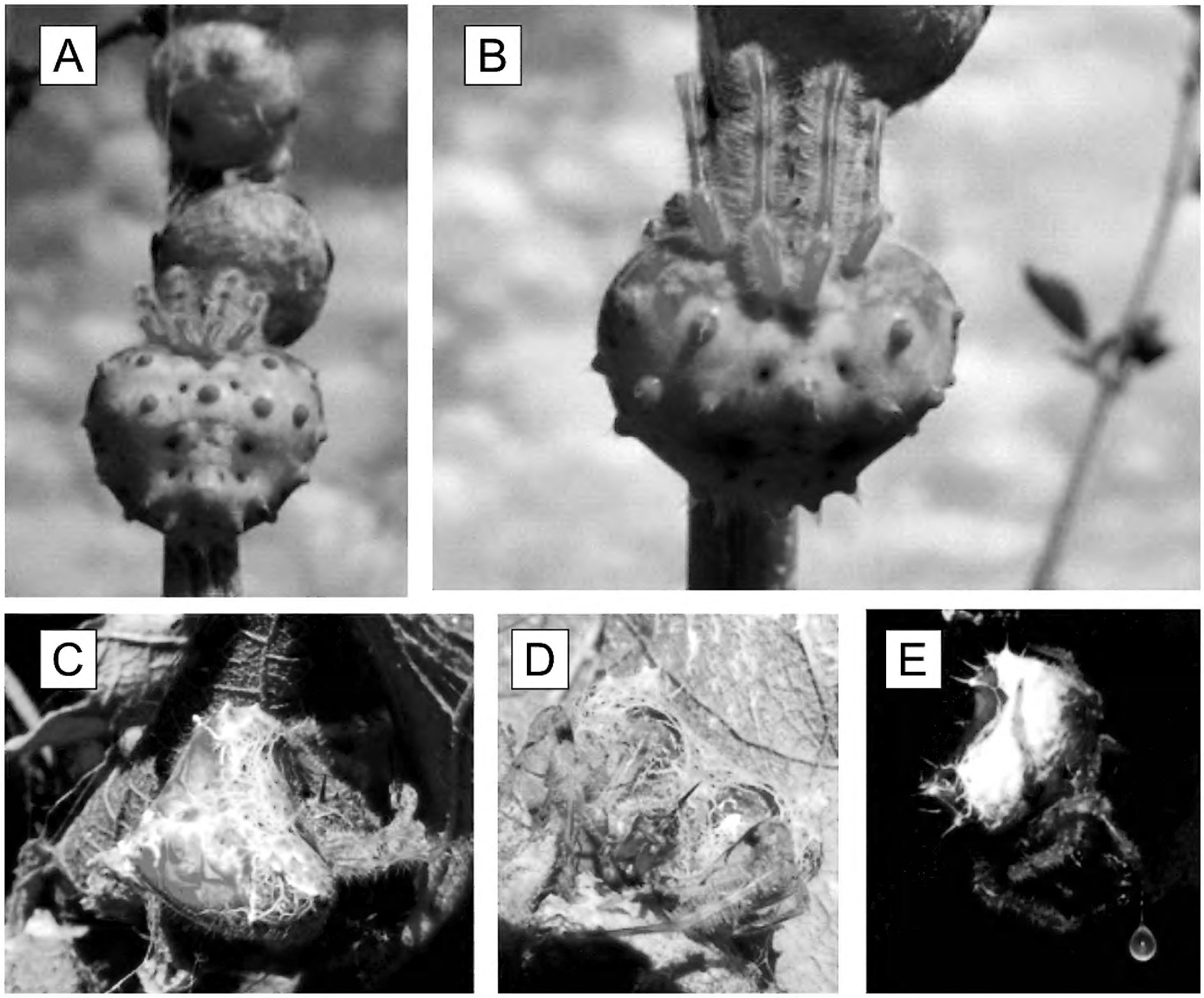

Figure 3. Habitus *Cladomelea akermani* and *C. debeeri*. **A, B.** Dorsal view, *C. akermani*, photos by J. Roff. **C, D.** *C. debeeri*, photos by J. Roff. **E.** Lateral view of *C. debeeri* with bolas. Photo by Len de Beer.

Cladomelea debeeri differs from *C. akermani* and *C. longipes* in the shape of the projections on the carapace (Fig. 3C, D). The abdomen is triangular (Fig 3C). The antero-lateral corners are studded with five prominent tubercles; each tubercle bearing a tuft of long white setae; posterior end with six tubercles, each bearing hair tufts. The male is unknown. Known only from South Africa (Fig 1).

Material examined. South Africa. KwaZulu-Natal • holotype ♀; 45 Milliken Road, Pietermaritzburg; 29.38°S, 30.38°E, Pietermaritzburg; ca 600 m above sea level; 12.v.2000; J. Roff; NCA 2003/1657.

Discussion

This contribution represents the first published records of *C. longipes* outside of its type locality. Although the type locality in the World Spider Catalog (2019) is listed as Congo, Pickard-Cambridge (1877) gave the type locality as the banks of the river Coanza, West Africa. This could be a misspelling of the river Quanza, an important river in Angola.

New records suggest that the species is much more widely distributed than previously thought, with records in both southern and west Africa. Included here are also the first images of live specimens and the epigyne. Although locally rare, this study points to a species that is widely distributed and, therefore, most probably not specialized on hunting specific moth species.

Acknowledgements

The manuscript benefited greatly from comments by Alireza Zamani, Charles Haddad, and Rudy Jocqué. This study was made possible by the financial support from Agricultural Research Council (ARC) and the National Research Foundation of South Africa. Authors want to thank to Mrs Meg Cumming of Harare, Zimbabwe and Karin Wiesler of Klaserie and John Roff of Hilton for images of the spiders and Robin Lyle (ARC) for photo of the epigyne and the curators of the Zoological Museum, University of Copenhagen and the Royal Museum for Central Africa for the loan of specimens.

Author's Contributions

ASD studied the specimens; ASD and SHF wrote the manuscript; SHF prepared the map.

References

Akerman C (1923) A comparison of the habits of a South African spider, *Cladomelea,* with those of an Australian *Dicrostichus.* Annals of the Natal Museum 5: 83–88.

Dippenaar-Schoeman AS (2014) Field guide of the spiders of South Africa. Lapa Publishers, Pretoria, 424 pp.

Dippenaar-Schoeman AS, Haddad CR (2014) Spiders of the Grassland Biome. Plant protection handbook no. 19, Agricultural Research Council, Pretoria, 120 pp.

Dippenaar-Schoeman AS, Haddad CR, Foord SH, Lyle R, Lotz LN, Helberg L, Mathebula S, Van den Berg A, Van den Berg AM, Van Niekerk E, Jocqué R (2010) First atlas of the spiders of South Africa. South African National Survey of Arachnida. SANSA technical report version 1, 1158 pp.

Eberhard WG (1977) Aggressive chemical mimicry by a bolas spider. Science 198: 1171–1175.

Eberhard, WG (1980) The natural history and behavior of the bolas spider *Mastophora dizzydeani* sp. n. (Araneidae). Psyche: a Journal of Entomology 87: 143–169.

Hewitt L (1923) On certain South African Arachnida, with descriptions of three new species. Annals of the Natal Museum 5: 55–66.

Haddad CR, Dippenaar-Schoeman AS, Foord SH, Lotz LN, Lyle R (2013) The faunistic diversity of spiders (Arachnida, Araneae) of the Grassland Biome in South Africa. Transactions of the Royal Society of South Africa 68: 97–122. https://doi.org/10.1080/0035919X.2013.773267

Levi HW (2003) The bolas spiders of the genus *Mastophora* (Araneae: Araneidae). Bulletin of the Museum of Comparative Zoology 157: 309–382.

Leroy J-M, Jocqué R, Leroy A (1998) On the behaviour of the African bolas-spider *Cladomelea akermani* Hewitt (Araneae, Araneidae, Cyrtarachninae), with description of the male. Annals of the Natal Museum 39: 1–9.

Lopez A (1987) Glandular aspects of sexual biology. In: Nentwig W (Ed). Ecophysiology of spiders. Springer-Verlag, Berlin, 121–129.

Pickard-Cambridge O (1877) On some new species of Araneidea, with characters of two new genera and some remarks on the families Podophthalmides and Dinopides. Proceedings of the Zoological Society of London 45: 557–578.

Pekár, S, Coddington JA, Blackledge, TA (2012) Evolution of stenophagy in spiders (Araneae): evidence based on the comparative analysis of spider diets. Evolution 66: 776–806.

Roff J, Dippenaar-Schoeman AS (2004) Description of a new species of *Cladomelea* bolas-spider from South Africa, with notes on its behaviour (Araneae: Araneidae). African Invertebrates 45: 1–6.

Scharff N, Coddington J (1997) A phylogenetic analysis of the orb-weaving spider family Araneidae (Arachnida, Araneae). Journal of the Linnean Society of London 120: 355–434. https://doi.org/10.1111/j.1096-3642.1997.tb01281.x

Simon E (1895) Histoire naturelle des araignées, 1. Paris, 761–1084.

Stowe MK, Tumlinson, IH, Heath RR (1987) Chemical mimicry: bolas spiders emitcomponents of moth prey species sex pheromones. Science 236: 964–967. https://doi.org/10.1126/science.236.4804.964

World Spider Catalog (2019) http://wsc.nmbe.ch. Accessed on 2019-06-05.

Yeargan, KV (1994) Biology of bolas spiders. Annual Review of Entomology 39: 81–99.